A Summary of Differences Between the 1997 Maine *Learning Results* and the 2007 Maine *Learning Results: Parameters for Essential Instruction*

2007 MLR:PEI	1997 MLR	Span	How it's different	Implications
Mathematics	Mathematics	All	Organizational differences: • The number of standards have changed from eleven (1997) to four (2007). Some "measurement" concepts are in the Data standard and some are in Geometry. • There are fewer performance indicators and some standards have been removed. This is not just a reorganization. • Within the standards are topic areas that are used to categorize indicators. • The grade span organization, K-2, 3-4, 5-8, and 9-12 in 1997 has changed to organization by grade span for PK-2 and 9-Diploma and grade level for 3, 4, 5, 6, 7, 8 in 2007. • "Descriptors" have been included for most performance indicators to further describe the intended depth and scope for each performance indicator and to provide guidance for the development of state assessments. • Some topics, e.g. whole numbers and rational numbers, "end" instead of being continued through all grades and grade spans. • Some topics, especially probability, are delayed until higher grades. • Examples are not included in 2007.	• These changes have eliminated the need for organization of standards by clusters and for the separate Grade Level Expectations document. • There is a grade span match to National Council of Teachers of Mathematics documents • Increased clarity of what is expected for state testing • Districts can expand the descriptor list based on local choice. • It is important to review topics from previous grades even if those topics do not appear at the current grade. • Exploration activities can begin in the year(s) before the performance indicator appears.

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A. Number Whole Number Rational Number Real Number	A. Numbers and Number Sense B. Computation	PK-2	• Addition and subtraction are specifically limited to two-digit numerals • Unit fractions are added.	• Explicit introduction in fractions should be included in the primary grades.
		3-5	• The whole number ceiling for grade 3 has moved up from 9999 to 10,000 while the ceiling for grade 4 has moved down from 1 million to 100,000; and in grade 5 a ceiling of 10 million is given. • For fractions, in grade 3 denominators have moved from fourths to tenths (the old grade 4 expectation). • Decimals to thousandths now appear in grade 5. • Recognizing the equivalence of decimal and fractional forms now begins in grades 4 and 5 with benchmark fractions. • The introduction of positive and negative integers has been delayed a year to grade 5. • Expectations for computation have, in general, accelerated.	• There will be more focus on number and computation. • Flexibility in number use is a goal. • Procedural fluency with accuracy and understanding is a goal.
		6-8	• Number theory is now developed in grade 6 instead of being stretched from grade 6 to grade 8. • Conversion among fractions, decimals and percents and computation with decimals, percentages and fractions are now expected in grade 6 • Ratios now begin in grade 6 instead of grade 7. • The use of signed rational numbers (integers, decimals and fractions) and computation with them is expected in grade 7 instead of grade 8. • Ratio and proportion are fully developed in grade 7 instead of waiting until grade 8. • An indicator for non-rational real numbers (π , $\sqrt{2}$, etc.) has been added in grade 8.	• Number theory will be focused in grade 6. • Grade 7 has a focus on proportional relationships. • The irrational numbers will be used with the Pythagorean Theorem.
		9-12	• Operations with numbers using other bases and formal treatment of the structure of the real number system are no longer required. • The existence of imaginary numbers as solutions to quadratics with no real roots is included but not the requirement to describe the uses of complex numbers.	• Place value concepts should be firmly established prior to high school. • Although not required, the formal treatment of sets of numbers is an important for those intending a study of higher mathematics.

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B. Data Measurement and Approximation Data Analysis Probability	F. Measurement (non-geometric) C. Data Analysis and Statistics D. Probability K. Mathematical Communication (grades 3-8)	PK-2	• Time, temperature, and money are included but weight is no longer included. • Data displays are now limited to picture graphs. • There are no probability performance indicators.	• Students should have experience with actual measurement. • Picture graphs can lead to introduction of bar graphs.
		3-5	• Data displays are introduced more slowly in the revised *Learning Results*. • Pie charts do not appear until grade 6. • Histograms do not appear until grade 7. • There are no probability performance indicators.	• Students should have experience with actual measurement. • This allows more time for the number focus.
		6-8	• Conversions are concentrated in grade 6 rather than spreading across grades 6 and 7. • Grade 7 has a focus on data and probability. • A broad variety of data displays is expected in grade 7. • Probability is first required in grade 7. • In grade 8, the concept of quartiles is now explicitly stated.	• Conversion is closely linked to ratio. • Students should choose among representations to best represent or communicate data. • Introductory probability experiences should occur before grade 7.
		9-12	• There is greater emphasis on the characteristics of the normal distribution and the use (but not computation) of standard deviation. • There is more descriptive vocabulary for the shapes of distributions. • Quartiles and mean absolute deviation are new. • Probability distributions have been removed, but expected frequency and expected value have been added.	• Measures of spread will need to be taught. • Students will need access to computing technology. • Students should have exposure to a variety of distributions in a variety of contexts. • Students should explicitly study characteristics of normal distributions. • Students should make predictions based on probabilities.

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C. Geometry Geometric Figures Geometric Measurement Transformations	E. Geometry F. Measurement (geometric)	PK-2	• The use of metric and traditional units of length is explicitly mentioned for length. • Capacity is included as a "proxy" for volume. • Positional words are no longer included in a specific indicator.	• Students will need experience with inches and centimeters. • Capacity or "how much it will hold" are better words than volume at this stage.
		3-5	• "Distance around a figure" has been added in grade 3. • Volume has been delayed from grade 4 to grade 5, but the computation of the volume and surface area of rectangular solids has been moved from grade 6 down to grade 5. • Areas of triangles and parallelograms have moved from grade 6 to grade 5. • The restriction to whole numbers in grade 5 for geometric measurement is no longer in place. • For figures, more factors including right angles are included in grade 3, as is composing and decomposing planar shapes. • The start of solid geometry is moved down to grade 5 from grade 7. • Transformations that were in grades 3 and 4 have been delayed to grades 4 and 5. • The use of the full coordinate plane is now in grade 5 (moved down from grades 6 and 7).	• Students should reinforce their understanding of, and facility with, numbers used in each grade level with the geometry content of the grade level. • For understanding, students should develop concepts using physical materials.
		6-8	• Areas of circles, and volumes and surface areas of triangular and rectangular right prisms have moved down to grade 6, but requirements in grades 7 and 8 are similar. • 2-D representation of 3-D shapes has been added in grade 6. There is an increased focus on properties of lines and angles in the plane in grade 7. • In grade 8 "geometric properties" are limited to polygons, parallel lines, and the Pythagorean Theorem. • Using transformation to determine congruence ("cover") is added in grade 6. • Scale drawings are added explicitly to grades 6 and 7.	• The emphasis on ratio and proportion in number extends to similar figures and scale drawings. • The ratio π can be approximated rationally. • Pythagorean relationships create the need for irrational numbers.
		9-12	• Explicit statements about coordinates and transformations in geometry do not appear. • Periodic trigonometry is removed. • There is greater specificity about figures expected.	• Transformations were introduced earlier and can be used in work with geometric figures.

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D. Algebra Symbols and Expressions Equations and Inequalities Functions and Relations	G. Patterns, Relations, and Functions H. Algebra	PK-2	• Solving simple open sentences is added.	• Students should practice more in "missing number" formats.
		3-5	• Expectations are increased. The algebraic structures are similar; but the numbers used mirror the increased number expectations of the revised *Learning Results.* • In grade 5, students are expected to use formulas with three variables instead of two.	• Algebra should be developed with the numbers students are using. • Formula use parallels the formulas from geometry in grade 5. • Practice computation by substituting into formulas.
		6-8	• There is an increased emphasis on function, proportionality, and rate of change in the interpretation and use of patterns. • There are increased expectations for algebra, primarily in grades 6 and 7. The limitations in number of steps in expression writing and evaluation from the Grade Level Expectations are no longer present. • Two-step equations are now included in grade 6. • In grade 7 students are expected to convert linear equations to general form (0 = ax + b). • In grade 8, manipulation of expressions is added	• It will be important that students have a strong understanding of number so that misconceptions about, or lack of facility with, numbers does not block their access to algebraic ideas and the use of algebra. • Linear relationships should be the focus although non-linear relationships should be included for contrast. • Multiple representation or relationships is important.
		9-12	• Polynomial manipulation is now explicitly described. • Logarithms receive greater emphasis. • Iteration and recursion are added. • Periodic trigonometry has been removed.	• Students should have fluency with variables as well as number. • Logarithms are used to solve exponential equations. • Recursion and iteration are useful for spreadsheet explorations.

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	I. Discrete Mathematics	All	• All Discrete Mathematics indicators have been removed.	• While indicators have been removed, discrete mathematics topics can be included in local programs.
Mathematical reasoning pervades all areas of mathematics. Mathematical reasoning is manifested through classification, comparison, deduction, induction, generalization, justification, verification, and spatial visualization.	J. Mathematical Reasoning	All	• All Mathematical Reasoning indicators have been removed.	• While distinct indicators have been removed, it is expected that students reason mathematically across all mathematics standards.
As lifelong learners students will research mathematics concepts and methods. They must learn about sources of mathematics information, how to read and comprehend mathematics, how to employ the mathematical ideas they learn, and how to communicate what they learn.	K. Mathematical Communication	All	• All distinct Mathematical Communication indicators have been removed, but much of the content is included in data analysis for grades 3-8.	• Clear and standard mathematical communication should be developed and expected from all students. • The expectation remains that students use standard mathematical notation. • Instruction should support mathematics-specific content literacy. • The use of definitions is one source of justification.